

CLAIMS

1. A flexible multi-layer medium comprising:
a flexible support layer having a first side and a second side;
a flexible antimicrobial layer adjacent said first side of said support layer; and
a flexible adhesive layer adjacent said second side of said support layer.
2. A medium according to claim 1 wherein said antimicrobial layer changes color as the effectiveness of said antimicrobial is reduced.
3. A medium according to claim 1 wherein said antimicrobial layer provides a controlled release of a antimicrobial material.
4. A medium according to claim 3 wherein said controlled release is accomplished by use of a diffusion layer placed over said antimicrobial layer.
5. A medium according to claim 3 wherein said antimicrobial material comprises an antimicrobial metal ion exchange material which is exchanged with at least one colored metal ion or colored metal ion complex.
6. A medium according to claim 5 wherein said antimicrobial metal ion is selected from one of the following:
silver
gold
copper
zinc
nickel

7. A medium according to claim 1 wherein a colored material is provided in said medium that has a diffusion rate substantially the same as the depletion rate of the active ingredient in said antimicrobial layer so that a visual indication will be provided as to the effectiveness of said active ingredient.

8. A medium according to claim 1 wherein the color change is about equal or greater than a 0.2 change in optical density.

9. A medium according to claim 8 where the color change is greater than a 0.5 change in optical density.

10. A medium according to claim 1 wherein the antimicrobial layer is made from one or more of the following antimicrobial compounds:

silver sodium zirconium phosphate

silver zeolite

or silver ion exchange resins,

benzoic acid, sorbic acid, nisin, thymol, allicin, peroxides, imazalil, triclosan, benomyl, metal-ion release agents, metal colloids, anhydrides, and organic quaternary ammonium salts.

11. A medium according to claim 1 wherein the support layer is made from one or more of the following:

resin-coated paper

paper, polyesters

micro porous materials

polyethylene

plain paper

coated paper

synthetic paper

photographic paper support

melt-extrusion-coated paper

laminated paper
biaxially oriented polyolefin
polypropylene
glass
cellulose derivatives
polyesters.

12. A medium according to claim 1 wherein the adhesive layer is made from one or more of the following:

reposition adhesive
flexible static-cling vinyl.

13. A medium according to claim 1 wherein the diffusion layer comprises a dye which diffuses from the diffusion layer when the sheet is exposed to a biological environment.

14. A medium according to claim 1 wherein the antimicrobial layer has a thickness in the range of .01 μm to 100 μm .

15. A medium according to claim 1 where the thickness of said antimicrobial layer is about 5 μm .

16. A medium according to claim 1 wherein the support layer has a thickness in the range of 0.025 mm to 5 mm.

17. A medium according to claim 1 where the thickness of said support layer is about 0.125 mm.

18. A medium according to claim 4 wherein the diffusion layer has a thickness in the range of 0.2 μm to 25 μm .

19. A medium according to claim 4 where the thickness of said diffusion layer is about 5 μm .

20. A medium according to claim 1 further comprising a subbing layer provided between support layer and said antimicrobial layer for providing proper adhesion of the antimicrobial layer to said support layer.

21. A medium according to claim 1 wherein a removable protective layer is provided over said adhesive layer for protecting said adhesive layer until it can be secured to a receiving surface.

22. A multi-layer medium comprising:
a support layer having a first side and a second side;
an antimicrobial layer adjacent said first side of said support layer, said antimicrobial layer having an indicating means for providing a visual indication of the effectiveness of the antimicrobial layer; and
an adhesive layer adjacent said second side of said support layer.

23. A multi-layer medium according to claim 22 wherein said visual indication means comprises a change in color when the effectiveness of said antimicrobial is reduced.

24. A medium according to claim 22 wherein said antimicrobial layer provides a controlled release of an antimicrobial material.

25. A medium according to claim 24 wherein said controlled release is accomplished by use of a diffusion layer placed over said antimicrobial layer.

26. A medium according to claim 24 wherein said antimicrobial material comprises an antimicrobial metal ion which is exchanged with at least one colored metal ion or colored metal ion complex.

27. A medium according to claim 26 wherein said antimicrobial metal ion is selected from one of the following:

silver

gold

copper

zinc

nickel

28. A medium according to claim 22 wherein a colored material is provided in said medium that has a diffusion rate substantially the same as the depletion rate of the active ingredient in said antimicrobial layer so that a visual indication will be provided as to the effectiveness of said active ingredient.

29. A medium according to claim 23 wherein the color change is about equal or greater than a 0.2 change in optical density.

30. A medium according to claim 29 where the color change is greater than a 0.5 change in optical density.

31. A medium according to claim 22 wherein the antimicrobial layer is made from one or more of the following antimicrobial compounds:

silver sodium zirconium phosphate

silver zeolite

or silver ion exchange resins

benzoic acid, sorbic acid, nisin, thymol, allicin, peroxides, imazalil, triclosan, benomyl, metal-ion release agents, metal colloids, anhydrides, and organic quaternary ammonium salts.

32. A medium according to claim 22 wherein the support layer is made from one or more of the following:

- resin-coated paper
- paper, polyesters
- micro porous materials
- polyethylene
- plain paper
- coated paper
- synthetic paper
- photographic paper support
- melt-extrusion-coated paper
- laminated paper
- biaxially oriented polyolefin
- polypropylene
- glass
- cellulose derivatives
- polyesters.

33. A medium according to claim 22 wherein the adhesive layer is made from one or more of the following:

- reposition adhesive
- flexible static-cling vinyl.

34. A medium according to claim 25 wherein the diffusion layer comprises a dye which diffuses from the diffusion layer when the sheet is exposed to a biological environment.

35. A medium according to claim 22 wherein the antimicrobial layer has a thickness in the range of .01 μm to 100 μm .

36. A medium according to claim 22 where the thickness of said antimicrobial layer is about 5 μm .

37. A medium according to claim 22 wherein the support layer has a thickness in the range of 0.025 mm to 5 mm.

38. A medium according to claim 22 wherein the thickness of said support layer is about 0.125 mm..

39. A medium according to claim 26 wherein the diffusion layer has a thickness in the range of 0.2 μm to 25 μm .

40. A medium according to claim 26 where the thickness of said diffusion layer is about 5 μm .

41. A medium according to claim 22 further comprising a subbing layer provided between support layer and said antimicrobial layer for providing proper adhesion of the antimicrobial layer to said support layer.

42. A medium according to claim 22 wherein a removable protective layer is provided over said adhesive layer for protecting said adhesive layer until it can be secured to a receiving surface.

43. A antimicrobial medium having a visual indicator for indicating the loss of effectiveness of the antimicrobial medium.

44. A medium according to claim 43 wherein said antimicrobial medium changes color as the effectiveness of said antimicrobial is reduced.

45. A medium according to claim 43 wherein said antimicrobial medium provides a controlled release of a antimicrobial material.

46. A medium according to claim 45 wherein said controlled release is accomplished by use of a diffusion layer placed over said antimicrobial layer.

47. A medium according to claim 46 wherein said antimicrobial material comprises a antimicrobial metal ion which is exchanged with at least one colored metal ion or colored metal ion complex.

48. A medium according to claim 46 wherein said antimicrobial metal ion is selected from one of the following:

- silver
- gold
- copper
- zinc
- nickel

49. A medium according to claim 43 wherein a colored material is provided in said medium that has a diffusion rate substantially the same as the depletion rate of the active ingredient in said antimicrobial medium so that a visual indication will be provided as to the effectiveness of said active ingredient.

50. A medium according to claim 43 wherein the color change is about equal or greater than a 0.2 change in optical density.

51. A medium according to claim 50 where the color change is greater than a 0.5 change in optical density.

52. A medium according to claim 43 wherein the antimicrobial medium is made from one or more of the following antimicrobial compounds:

silver sodium zirconium phosphate

silver zeolite

or silver ion exchange resins,

benzoic acid, sorbic acid, nisin, thymol, allicin, peroxides, imazalil, triclosan, benomyl, metal-ion release agents, metal colloids, anhydrides, and organic quaternary ammonium salts.

53. A medium according to claim 43 wherein the antimicrobial medium has a thickness in the range of .01 μm to 100 μm .

54. A medium according to claim 43 where the thickness of said antimicrobial medium is about 5 μm .

55. A medium according to claim 43.

56. A multi-layer medium comprising:

a support layer having a first side and a second side;

a antimicrobial layer adjacent said first side of said support layer having controlled release of the active antimicrobial ingredient in said antimicrobial layer, and

an adhesive layer adjacent said second side of said support layer.

57. A medium according to claim 56 wherein said antimicrobial layer changes color as the effectiveness of said antimicrobial is reduced.

58. A medium according to claim 56 wherein said antimicrobial layer provides a controlled release of an antimicrobial material.

59. A medium according to claim 57 wherein said controlled release is accomplished by use of a diffusion layer placed over said antimicrobial layer.

60. A medium according to claim 57 wherein said antimicrobial material comprises a antimicrobial metal ion which is exchanged with at least one colored metal ion or colored metal ion complex.

61. A medium according to claim 60 wherein said antimicrobial metal ion is selected from one of the following:

- silver
- gold
- copper
- zinc
- nickel

62. A medium according to claim 56 wherein a colored material is provided in said medium that has a diffusion rate substantially the same as the depletion rate of the active ingredient in said antimicrobial layer so that a visual indication will be provided as to the effectiveness of said active ingredient.

63. A medium according to claim 56 wherein the color change is about equal or greater than a 0.2 change in optical density.

64. A medium according to claim 63 where the color change is greater than a 0.5 change in optical density.

65. A medium according to claim 56 wherein the antimicrobial layer is made from one or more of the following antimicrobial metal ion compounds:

silver sodium zirconium phosphate

silver zeolite

or silver ion exchange resins,

benzoic acid, sorbic acid, nisin, thymol, allicin, peroxides, imazalil, triclosan, benomyl, metal-ion release agents, metal colloids, anhydrides, and organic quaternary ammonium salts.

66. A medium according to claim 56 wherein the support layer is made from one or more of the following:

resin-coated paper

paper, polyesters

micro porous materials

polyethylene

plain paper

coated paper

synthetic paper

photographic paper support

melt-extrusion-coated paper

laminated paper

biaxially oriented polyolefin

polypropylene

glass

cellulose derivatives

polyesters.

67. A medium according to claim 56 wherein the adhesive layer is made from one or more of the following:

reposition adhesive
flexible static-cling vinyl.

68. A medium according to claim 56 wherein the diffusion layer comprises a dye which diffuses from the diffusion layer when the sheet is exposed to a biological environment.

69. A medium according to claim 56 wherein the antimicrobial layer has a thickness in the range of 0.1 μm to 25 μm .

70. A medium according to claim 56 wherein the thickness of said antimicrobial layer is about 5 μm .

71. A medium according to claim 56 wherein the support layer has a thickness in the range of 0.025 mm to 5 mm.

72. A medium according to claim 56 where the thickness of said support layer is about 0.125 mm.

73. A medium according to claim 59 wherein the diffusion layer has a thickness in the range of 0.2 μm to 25 μm .

74. A medium according to claim 59 where the thickness of said diffusion layer is about 5 μm .

75. A medium according to claim 56 further comprising a subbing layer provided between support layer and said antimicrobial layer for providing proper adhesion of the antimicrobial layer to said support layer.

76. A medium according to claim 56 wherein a removable protective layer is provided over said adhesive layer for protecting said adhesive layer until it can be secured to a receiving surface.

77. An antimicrobial material for detecting exposure to a pathogen, comprising an antimicrobial metal ion exchange material which is exchanged with at least one colored metal ion or colored metal ion complex.

78. An antimicrobial material according to claim 77 wherein said color of said material indicates the effectiveness of said antimicrobial material.

79. An antimicrobial material according to claim 77 wherein said antimicrobial material provides a controlled release of a antimicrobial material.

80. An antimicrobial material according to claim 79 wherein said controlled release is accomplished by use of a diffusion layer placed over said antimicrobial layer.

81. An antimicrobial material according to claim 77 wherein said antimicrobial metal ion is selected from one of the following:

silver

gold

copper

zinc

nickel

82. An antimicrobial material according to claim 77 wherein the antimicrobial material comprises one or more of the following antimicrobial compounds:

silver sodium zirconium phosphate
silver zeolite
or silver ion exchange resins,
benzoic acid, sorbic acid, nisin, thymol, allicin, peroxides, imazalil, triclosan,
benomyl, metal-ion release agents, metal colloids, anhydrides, and organic
quaternary ammonium salts.

83. An antimicrobial material according to claim 77 wherein
said material includes a support layer made from one or more of the following:

resin-coated paper
paper, polyesters
micro porous materials
polyethylene
plain paper
coated paper
synthetic paper
photographic paper support
melt-extrusion-coated paper
laminated paper
biaxially oriented polyolefin
polypropylene
glass
cellulose derivatives
polyesters.

84. An antimicrobial material according to claim 77 wherein an
adhesive layer is provided which is made from one or more of the following:

reposition adhesive
flexible static-cling vinyl.

85. A plurality of multi-layer sheets layered together to form a stack of flexible multi-layer medium comprising: a flexible support layer having a first side and a second side; a flexible antimicrobial layer adjacent said first side of said support layer; and a flexible adhesive layer adjacent said second side of said support layer.

86. A flexible multi-layer medium comprising:
a flexible support layer having a first side and a second side;
a flexible antimicrobial layer adjacent said first side of said support layer; and
a flexible adhesive layer adjacent said second side of said support layer that can be configured to a non flat surface.

87. A method of attaching the flexible multi-layer medium of claim 1 is attached to a surface via the adhesive layer.

88. A method of claim 87 wherein the antimicrobial material is released in a controlled fashion by use of a diffusion layer placed over said antimicrobial layer.

89. A method of claim 87 wherein the antimicrobial material is substantially depleted or is substantially no longer effective and is peeled from the surface and replaced with a new sheet of multilayer medium.

90. The method of claim 87 wherein the antimicrobial material for determining when the antimicrobial properties of the sheet of multilayer medium changes color as the effectiveness of said antimicrobial is reduced.